

**SYSTEM FOR AWARDING A BONUS TO A GAMING
DEVICE ON A WIDE AREA NETWORK**

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CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of prior U.S. Application Serial No. 10/256,949 filed September 27, 2002, which claims priority from provisional application US 60/326,030 filed September 28, 2001, the contents of which are hereby incorporated herein for all purposes.

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1. Field of the Invention

The present invention relates to awarding a bonus on a network of gaming devices, and—more particularly—awarding such a bonus on a wide area network.

2. Background of the Invention

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Many casino operating companies own multiple casinos in several locations. It has proved to be advantageous for such companies to devise player loyalty promotions that span these properties. Historically, multi-property player management systems accumulate player activity across all properties. For example, many casinos track a player's total wagers, theoretical win, actual win, complementary balance, player point balance, and other key player behavior statistics across all casinos managed by that operator.

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This information may be used to determine a global worth of the player to the operator, as opposed to a single playing location. Many casino operators accomplish this by dividing their player database into tiers, with the highest tier being the most valuable players and the lowest tier being the least valuable players from the casino's perspective. The casino typically uses a statistic such as theoretical win to establish player worth. Once this global player worth is established, casinos target promotional offers commensurate a player's worth. The promotions are designed to entice further play at one or more of the operator's casinos.

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The promotions usually take advantage of the multi-property nature of the business, such as allowing redemption of promotions at all casinos; targeting redemptions to a single property that might have more capacity than other properties; and using a complementary trip to a more desirable property as a promotional offer.

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All of these generally rely on manual processes for communication of promotional information to the customers and for redeeming promotions. For example, promotional offers are generally communicated via direct mail to qualifying players, or via brochures, signage

and literature at a casino. Further, redemption of promotional offers—whether they are cash, complementaries, etc.—is generally done manually at a players-club booth at each casino.

As used herein, the term *bonus* is an award, e.g., like the promotional offer, given to a player of an electronic gaming machine (EGM). The term *bonus* herein refers to any such award that is not paid by the device in accordance with its pay table. Such bonuses and systems for implementing them are described in US Patent No. 5,655,961 (the '961 patent) and in US Patent Application No. 08/843,011, both of which are hereby incorporated herein by reference for all purposes. Also hereby incorporated by reference for all purposes is US Patent No. 6,375,569, which describes a bonus promotion like the one described herein, except implemented at a single casino. A bonus can include an award of cash or machine credits, player points, or complementary amenities.

In a first implementation of the present invention, as participating EGMs are played, a user-selected percentage of the play is added to a common bonus pool. When the pool reaches a randomly selected level of play, between specified minimum and maximum numbers, a winner is randomly selected. The award can be a fixed cash amount, a cash amount linked to the bonus pool total or a non-cash prize. Prizes that are typically smaller than the winning bonus can also be awarded to non-winning players.

In the preferred embodiment, a master server, located at one of a plurality of participating casinos, communicates over a wide area network with slave servers located at each participating casino. The preferred embodiment may support a master server, up to 32 slave servers, and may accommodate as many as 16 different bonus pools that operate to pay a bonus award to one of the EGMs associated with the respective pools. It should be appreciated that other embodiments could support more or less slave servers and bonus pools. For each bonus pool, the master server selects a winning slave server, which in turn selects a winning EGM.

The preferred embodiment is called the Random Rewards[®] promotion. The promotion is complete when the amount of play on participating EGMs reaches the randomly selected number between the minimum and maximum numbers, which are specified at the master server. The randomly selected number is called the lucky number. Preferably a player must be issued a player-tracking card to be eligible to participate. Although the invention is not so limited, a typical implementation is for a plurality of casinos that are commonly owned with each recognizing a player-tracking card issued by any of the others. As a result, player activity is tracked—in a known manner—across all of the casinos.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of a multi-property bonus system implemented in accordance with the present invention.

Fig. 2 is a flow chart depicting some of the operation of the system depicted in Fig. 1.

Detailed Description of the Preferred Embodiments

Turning now to Fig. 1, indicated generally at 10 is a system constructed in accordance with the present invention. It includes a wide-area network (WAN) 12 that incorporates a single master server 14. Also included in the WAN is a configuration workstation 15, including a keyboard, monitor, and software, that permits a user of the workstation to configure the master server. Portions of WAN 12 are located at different casinos, one of which is depicted generally at 16. Each casino includes a local area network (LAN), like LAN 18a at casino 16. LAN 18a includes a router 20; a concentrator 24; a slave server 26, which—among other things—tracks carded EGM play in a known manner; a player server 27, which provides messages to displays associated with the EGMs; a key distribution center 29 (KDC), which implements security as will be described; and a plurality of EGMs, only two of which are exemplary slot machines 28, 30. In addition, a bank controller 31 facilitates communication between slot machines 28, 30 and concentrator 24. Bank controller 31 provides the same function for an animation computer 33, which generates animated content that appears on a display 35.

The same components (except for a master server, like master server 14) appear in LANs 18a, 18b, 18c, 18d (not shown) at each of the other casinos (also not shown) on the WAN. It should be appreciated that the master server may also be located at a site remote from any of the participating casinos, or—as in the present embodiment—at one of the casinos; specifically, master server 14 is located at casino 16. Although specified network structure is depicted, the invention can be implemented on any suitable network, regardless of its design or the hardware with which it is implemented.

Router 20 transmits data packets between the master server and each slave server over WAN 12. Depending on topography of the network, a hub could be used in lieu of router 20. Concentrator 24 is a network device similar to a hub that provides communication routing for devices on the network.

As described in the '961 patent, each EGM at each casino includes a communication board. This board, among other things, receives bonus promotion and message information

from bonus servers and sends EGM meter information, among other things, to network computers, including the slave server, like slave server 26.

Consideration will now be given to configuration of master server 14, which must be undertaken before play can begin. Master server 14 is configured at workstation 15 with a user-specified contribution rate that EGMs contribute to the growth of a bonus pool, which is called the current pool. In general terms, as participating EGMs are played, the current pool is incremented by the contribution rate multiplied by the total play on the EGMs. When the current pool reaches or exceeds the lucky number, the master server randomly selects a winning slave server. The winning slave server then randomly selects the winning EGM.

EGMs that require different denominations to play can be incorporated into the same pool using known techniques to account for the difference in denominations from game-to-game within the pool.

In the multi-casino Random Rewards[®] promotion, selecting minimum and maximum numbers at master server 14 specifies the range from which the winning number is selected.

The range corresponds to a level of play by the participating EGMs; the total current pool results from all plays made on all EGMs participating in the multi-casino promotion. Master server 14 is also configured with a list of all slave servers participating in the promotion. The current pool represents the combined contributions of each slave server. Each slave server pool total further represents the combined contribution of all EGMs participating in the promotion at the associated slave server's casino.

Each slaver server is also configured, primarily by designating which EGMs are linked to a particular bonus pool. The slave servers are also configured using their associated workstation, like server 26 is configured by workstation 15. Each local configuration workstation can be used to configure the master server and the associated local server, but a workstation at one location cannot be used to configure a slave server at another location.

Consideration will now be given to operation of system 10, with reference to the flow chart of Fig. 2, after the master and slave servers are configured as described above. As EGMs are played in step 32, their respective meters increment in step 34. In a step not depicted in Fig. 2, prior to initiation of a bonus pool, the master server transmits the pool contribution rate—a typical rate being in the .001% to 3% of all coin-in—to each slave server. In step 36, each slave server aggregates meter information from each EGM in its associated casino. Master server 14, whose identity is unknown to the slave servers, sends a display message on a periodic basis—in step 38—that includes the total accrued value of the

bonus pool to slave servers. This message operates like a heartbeat. With each such transmission, the slave causes the total bonus pool—accrued from all participating casinos—to be displayed, either on displays associated with each EGM or on overhead display 35, or both. The slave servers respond, in step 40, to each heartbeat message by (a) causing the
5 updated value of the total bonus pool to be displayed and (b) sending their new local pool values to the master server. In the present embodiment, the heartbeat occurs approximately every 5 seconds, but this period can be adjusted upwardly or downwardly.

In the present example, the meter specified at master server 14 to track play is one created for this bonus, namely a carded coin-in meter. This meter counts all coin into the
10 EGM that has a player associated with the EGM as a result of the player's player-tracking card being inserted into a card reader associated with the EGM.

Other meters, such as the coin-in meter, the game meter, the win meter, or another created meter can also be used. Each slave server is updated every half-second with data identifying each EGM whose coin-in meters advanced in the preceding half second and the
15 amount of advance by each. From this the slave server calculates the total coin in for the period and multiplies this times the contribution rate to produce a number equal to the total accrued contribution by that slave server, and therefore its associated casino, since the current pool began accruing. This local pool value is the number transmitted over the WAN in step 40 to the master server.

The slave servers send the total accrued contribution of the casino—i.e., the local pool value—rather than incremental changes to reduce the negative effects caused by
20 communication errors. Sending totals reduces problems arising from packets lost during transmission and obviates the need to reset or synchronize with the master server during increment processing. The master server then compares the new slave pool total with the previous slave pool total (even if power outages or other difficulties prevented transmission
25 of packets for one or more heartbeats) to determine the amount of change, which it then adds to the current pool in step 42. When the current pool reaches the lucky number—in step 44—the winner is selected. If the lucky number is not reached, play and processing continues as shown.

Once the lucky number is reached, the master server determines a winning slave
30 server. The winning slave server is chosen randomly among slave servers generating local pool increases responsive to the heartbeat that caused the current pool to exceed the lucky number. The random selection, however, is weighted proportionate to the local pool contribution reported by each casino when a winning slave server is chosen. In other words,

casinos that generate larger wagers or more play advance the lucky number count more, and are therefore more likely to reach the lucky number.

Once the master server has randomly selected a winning slave server, the master server sends point-to-point messages to each slave server identifying the winning slave server. The winning slave server then identifies a winning EGM also based on a weighted random process. It selects the next half-second of updated play data (described above) to randomly choose a winning EGM from those that had a coin-in event in the selected play data. The random selection is, however, weighted to give a proportionately greater chance of winning to EGMs as a function of the amount of the wager. In other words, the bigger the wager, the more likely it is that an EGM will be selected. The winning EGM pays the bonus, in response to a command from the slave server, and updates its history record. The selected EGM may, but need not, be locked to prevent further play. The EGM may be locked in different ways, depending upon system configuration. First, the user may check a box in a panel appearing on the display of workstation 15 that requires each EGM to lock up whenever the EGM is a Random Rewards[®] winner. Second, if the box is not checked, an award may or may not be locked up. The EGM manufacturer configures the EGM for a maximum jackpot payable on the EGM credit meter. If the Random Rewards[®] payment is below that maximum, the payment is paid to the credit meter, from which it can be wagered or cashed out. If the payment is greater than the maximum, the machine is locked up.

In another aspect of the invention, one or more slave servers can be configured to award another bonus, preferably the Celebration Prizes[®] promotion, when a Random Rewards[®] winner is selected. In the Celebration Prizes[®] promotion, the slave server can be designated to award preselected EGMs a bonus when a Random Rewards[®] winner is selected. Only EGMs that are linked to the bonus pool that includes the winner are eligible for the Celebration Prizes[®] payment. Each slave server can be set to provide the Celebration Prizes[®] promotion, or not, and each property that provides it can set criteria establishing which of the eligible EGMs are awarded a Celebration Prizes[®] bonus. For example, of the eligible EGMs, Celebration Prizes[®] winners might be only those with a player's card in, or those whose last bet was a maximum bet, or those who registered a coin drop within a predetermined period of time, or some combination of these or other criteria.

Following payment to the selected EGM, the bonus promotion is continuously repeated. One or more of the bonus pools can be modified by either ending it or making changes to its parameters, such as the contribution rate and the minimum and maximum

numbers that define the range from which the lucky number is randomly selected. Commands to modify a pool are entered at workstation 15. The modifications are effective immediately, modifying the current pool. In an alternative embodiment, the modifications are not implemented until after a Random Rewards® winner is selected for the current game associated with the pool to be modified. The commands set a flag, which implements a process after the current game. As a result, the modifications are made commencing with the next game associated with the modified pool.

A new bonus promotion begins by subtracting the lucky number from the current pool, and creating a new current pool by adding a base amount, which is the minimum number for the lower end of the range from which the lucky number is selected; a hidden pool; and a delayed pool (both described below) that are accrued from prior games.

For example, assume that the minimum pool level (base amount) is \$1000 and the hidden pool increment rate is 2%. After \$2000 of play, the hidden pool value is at \$40. If the promotion selects a winner at this point, the sum of the base amount and the hidden pool is \$1040, which is put into the current pool. After summing, the hidden pool is reset to zero.

After an award is given and the current pool is established as described above, the hidden pool and the current pool are each adjusted by the delayed pool (described below), and a new lucky number is set between the value of the current pool and the maximum number.

The master server and the slave servers each maintain a delayed pool, which is not displayed to bonus promotion participants and does not contribute to the growth of the current pool during the current promotion. The slave delayed pool is comprised of play on eligible EGMs that were not able to contribute to the bonus. For example, if communication between an EGM and a slave server were lost for a period of time, restoration of communication could cause an immediate large incremental contribution from the EGM resulting from sudden realization of accrued off-line contributions. The restored EGM therefore has a disproportionate opportunity to win the bonus because of the weighting of play involved in the selection of the winning EGM.

When an EGM goes off-line and shows an increment to the slave server after coming back on-line, the total increment goes into the slave server's delayed pool. In other words the delayed pool at each slave server is not multiplied by the contribution percentage; the entire amount of wagers that occurred off-line goes into each slave server's delayed pool. The value

of the delayed pools is accrued at each slave server and periodically transmitted to the master server, which maintains the total accrued delayed pool.

The master server's delayed pool works much like the slave servers. The master server delayed pool is comprised of two components. The first component is the delayed pool contributions in dollars from disrupted EGMs. The second component is slave server contribution totals that were not able to contribute to the bonus, again perhaps because of communication difficulties between the slaves and the master. As will be recalled, these totals have already been multiplied by the contribution percentage. As a result, when communication is restored, this component cannot be added directly into the first component of the master server delayed pool. Rather, these totals must be divided by the contribution rate to convert them back to dollars.

The contribution rate, however, can vary from one bonus promotion to the next. The master server must therefore undo the calculation previously applied by the slave server prior to reporting to the master by dividing the slave's accrued contribution by the user-selected percentage from the previous bonus promotion to determine the actual dollars played while the slave server was off-line. The increment in these actual dollars that accrued before the slave went off-line is then added to the delayed pool.

Once the master server has the actual dollars played in the delayed pool—derived from the slave's delayed pools and from undoing the pool contribution calculations as just described—it is distributed to both the new current pool and hidden pool using increment rates defined for the current and hidden pools. As a result, the base amount, and the hidden and delayed pools provide the initial funding for the new bonus pool.

If applying the percentage of the delayed pool to the current pool puts the current pool over 90% of the range between the minimum and maximum numbers, the amount applied from the delayed pool to the current pool is set to 90% of this range. This defines the minimum number and creates a relatively narrow range from which the lucky number is selected. In other words, the current pool is likely to hit a winner in a relatively short time. As the games continue, the amount applied from the delayed pool to each new current pool is limited in the same fashion until the applied percentage from the delayed pool is less than 90% of the range.

It should be appreciated that the amount of the award can be the lucky number. Or it can be a fixed amount or a noncash award, such as a car or the like.

Consideration will now be given to the features that enhance security in system 10. Generally speaking, key distribution center 29 (KDC), manages different types of keys,

which will be shortly described, to encrypt digital messages on each LAN, like LAN 18A, and between each LAN and master server 14. Generally speaking, three different types of keys are used in system 10: a setup key, a master node key, and a session key. These keys are used, as will be shortly described, to authenticate and verify messages on the WAN and the LAN. Every message between master server 14 and each of the slave servers, like slave server 27, is authenticated with a signature. Likewise, all messages that authorize a bonus payment between each of the slave servers and the communications boards in their associated slot machines, like slot machine 28, 30, are also signed to authenticate the message.

Consideration will first be given to the setup key, which is a single identical key shared by each of the participating nodes, namely, each slave server, like slave server 27; master server 14; and each of the communication boards in the slot machines, like slot machines 28, 30, that may be selected to participate in the Random Rewards[®] bonus. The setup key can be installed by installing it in firmware associated with each node. This installation may be accomplished in several ways, including simply including it during the manufacturing or installation process in firmware memory. Preferably, one half of the setup key is encoded on each of two separate magnetic-strip cards. The setup key is then installed by requiring two individuals to swipe each card at each of the nodes, thereby downloading the setup key at each node. This procedure enhances security of the setup keys.

Next, each participating node uses the setup keys to generate a master node key that is a private key shared only between KDC 29 and the node in question. In other words, the KDC generates and stores a private key-pair between the KDC and each participating node in the entire WAN.

Shortly after each node receives the setup key, whether installed in firmware at the outset or installed after system 10 becomes operational, the node sends a request for creation of a master node key to KDC 29. This message is authenticated using a message digest encrypted with the setup key. KDC 29 responds by randomly generating a master node key that is encrypted using the setup key and a 64-bit International Data Encryption Algorithm (IDEA[™]) Cyphertext Feedback (CFB). This message is also authenticated using a message digest encrypted with the setup key.

The requesting node then sends another message to the KDC, which generates a node table entry and stores the master key for that node. This message is authenticated using a message digest encrypted with the master node key. Thereafter the KDC sends a final message to the requesting node that causes it to remove all memory containing the setup key.

This final message is authenticated using a message digest encrypted with the master node key.

The final key, the session key, is implemented by the KDC when it first starts up and periodically thereafter as will be shortly described. A counter, known as the session index, is associated with each session key. Each time the KDC changes session keys, it increments this counter. Whenever a node stores the session key, it associates it with the key counter and makes the key counter part of every message it encrypts. As a result, the receiving node can determine which session key was used for encryption. This is important during the time when session keys are changing, since not all nodes switch simultaneously. All nodes are periodically informed of the current session key index through a plain text message the KDC broadcasts across the entire WAN every 10 seconds. When a node detects that the broadcast session key index identifying the current key is different from the index it has stored, it requests the new session key using a session key request procedure. Once it receives the new session key, the old session key is discarded. This procedure accommodates new devices, devices that have been offline when the period for changing the session key passes (described below), and other situations in which a node does not have the current session key.

The procedure for requesting the session key starts when the requesting node sends a plain text request to KDC 29 requesting the new session key. The KDC responds with a message confirming the request authenticated using the master node key. The node responds by sending a message authenticated using the master node key. This causes the KDC to send the new session key encrypted using the master node key with a 64-bit IDEA™ CFB. It is likewise authenticated using the master node key.

In the present embodiment of the invention, the transmitting node, whether it is the master or slave server, generates the signature by computing the Secure Hash Algorithm (SHA1) over the entire contents of the message. The SHA1 results are then encrypted with a 64-bit International Data Encryption Algorithm (IDEA™) and the current session key.

It can be seen that all messages containing accumulated game play, which the master server uses to maintain the pool, and all pay commands from each slave server to its associated slot machines, are digitally verified and authenticated. As a result, the security of system 10 is greatly enhanced.

In one aspect of the present invention, the user, via configuration workstation 15 can generate an input command to set the period for changing the session key and can modify the period by preselecting a range above and below the selected period during which the session key is randomly distributed. For example, if the user selects 600 minutes as the period for

changing the session key, and the range is 10, the session key remains valid for between 590 and 610 minutes. At a randomly selected time between 590 and 610 minutes after the session key is established, a new session key is distributed. This feature further improves system security.

5 Also, the user, via the configuration workstation, can remove a node from the system when there is a security breach. Similarly, the user can use the configuration workstation to enter a command that overrides the automated changing of the session keys just described to require that a new session key be immediately distributed. Both of these features further enhance system security.

10 The present embodiment has been illustrated with a single master server having multiple slave servers connected via a WAN. More than one master server could implement bonuses on the same WAN. In other words, another master server could be added to the WAN. The additional master would have its own slave servers and maintain bonus pools that are separate from the other master or master servers.

15 Finally, consideration will be given to payment of other bonuses, such as promotional awards, in addition to the Random Rewards[®] promotion described above. The present invention can implement direct payment of these rewards across multiple properties at the slot machine including, e.g., direct transfers of redeemable credits to the slot machine; direct transfers of non-redeemable credits to the slot machine (Xtra Credit[®]), as described in U.S.
20 Patent Application No. 09/134,598, filed August 14, 1998, which is hereby incorporated by reference for all purposes; and temporary change of the machine award schedule.

 As in the existing single property implementations, the extension of bonusing concepts to the multi-property environment also allows more streamlined communication of promotional information. Instead of, or in addition to, more traditional communication
25 methods such as direct mail or brochures, direct communication of promotional information can occur at the slot machine.

 In addition, several features and functions that rely on the multi-property aspect can be implemented by the present invention. For example:

- To stimulate visitation at some subset of properties a bonus delivered at the machine
30 could be earned only by playing qualifying amounts at several specified casinos
- To simulate play at a given property earning an award at one casino and stipulating redemption or payment only at another casino.

- To stimulate cross-property play, players qualify for special rewards only after hitting specified special game outcomes at some subset of properties

The present invention can also be implemented to automate delivery of promotional, loyalty-based bonuses at multiple casinos on a WAN as described herein. Such a system has
5 the following characteristics:

- Players are assigned an account number and are provided with some means to identify themselves to the system during each play session. A typical method is the use of a magnetically encoded card that is read by a card reader built into each slot machine.
- During a play session, the system records pertinent statistics, such as coins wagered,
10 coins won, coins payout, etc. The system stores these statistics for each player.
- This stored information includes play at all locations
- This composite information containing all play information is used as one factor in determining a patron's eligibility for participation in loyalty bonus award programs.
- In addition to enterprise-wide points and complementary awards, balances in the
15 system also store various enterprise wide bonus balances. These bonus balances are accessible at all properties. Examples of this might be:
 - o Xtra Credit[®] balance, referred to above.
 - o Personnel Progressives[®] balance: the current amount of a player specific pool that accrues as a set percentage of total dollars wagered. The player watches the pool
20 grow. When the pool reaches a certain level a bonus prize is awarded from the pool.

While the invention has been shown and described with reference to a certain preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope
25 of the invention as defined by the appended claims.